

NCATE PROGRAM STANDARDS FOR EDUCATIONAL COMPUTING AND TECHNOLOGY

Program for Initial Preparation of Teachers of:

Educational Computing and Technology Literacy
Endorsement

Secondary Computer Science Education
Endorsement and Degree

Program for Advanced Preparation of Teachers of:

Educational Computing and Technology Leadership

**Prepared by the
International Society for Technology in Education (ISTE)**

The revised program standards for the educational computing and technology initial literacy endorsement and the educational computing and technology leadership advanced programs were approved by NCATE October 1996. Institutions must respond to these program standards if their on-site visits are scheduled for Fall 1998 and afterwards. Institutions with visits scheduled prior to Fall 1998 have the option of responding to these program standards. The program standards for the initial secondary computer science initial endorsement and degree programs were approved by NCATE in October 1997. Institutions must respond to these program standards if their continuing on-site visits are scheduled after 1999, or if their initial visits are Fall 2000 or after.

Institutions seeking NCATE accreditation are required to respond to the curriculum sections of ISTE's program standards as adapted for this document. The program review document preparation manual, *Curriculum Guidelines for Accreditation of Educational Computing and Technology Programs* (1997), can be purchased from ISTE, 1787 Agate Street, Eugene, OR 97403-1923, phone 541 346-4414, <http://www.iste.org>.

Program Standards for Preparation Programs in Educational Computing and Technology

Introduction

Educational computing and technology is an emerging field, which encompasses many subdisciplines. This field includes knowledge about and use of computers and related technologies in (1) delivery, development, prescription, and assessment of instruction; (2) effective use of computers as an aid to problem solving; (3) school and classroom management; (4) educational research; (5) electronic information access and exchange; (6) personal and professional productivity; and (7) computer science education.

The International Society for Technology in Education (ISTE) recognizes that educational computing and technology foundations are essential for all teachers. ISTE also acknowledges educational computing and technology specialty areas beyond these foundations and has established program standards for initial and advanced programs. These program standards will assist teacher education units, and professional organizations and agencies in understanding and evaluating the educational preparation needed for specialization within the field.

Programs will prepare candidates to keep abreast of changes in educational computing and technology and their impact on education. In addition, candidates will be equipped to utilize and integrate a broad range of educational computing and technology applications to enhance student learning. Finally, candidates will be prepared to work effectively as professional leaders to advance their specific fields within a culturally diverse society.

Who should complete these program standards?

This document contains program standards for initial and advanced educational computing and technology programs including: (1) the educational computing and technology literacy endorsement; (2) the secondary computer science education endorsement; (3) the secondary computer science education initial degree program; and (4) the advanced educational computing and technology leadership program. Institutions that offer one or more of these programs should respond to the program standards corresponding to the appropriate program(s).

Educational computing and technology literacy endorsement programs prepare teachers of computer literacy and computer applications. These programs provide general foundations and other skills for teachers who will be delivering instruction in technology-enriched settings.

Computer science education programs provide content area and professional education instruction in secondary computer science. The computer science education endorsement program is designed to prepare teachers who have primary certification in another field to add a teaching endorsement in computer science education. The computer science education initial degree program provides program standards for preparation in computer science as the primary area of certification.

The educational computing and technology advanced program standards apply to programs designed to prepare candidates to serve as Educational Computing and Technology Coordinators or Specialists. Special preparation in computing systems, facilities planning and management, instructional program development, staff development, etc. prepares candidates to serve in technology-related leadership positions at district, regional, and/or state levels.

INSTRUCTIONS FOR PREPARING THE PROGRAM REVIEW DOCUMENT

NCATE program review document(s) for educational computing and technology programs must include the items listed on the cover sheet. Use the Faculty Survey Form to report information regarding faculty-teaching courses in the specialization and professional education program.

Use the attached matrix to provide a summary of your program(s). The information provided in the matrix should describe and substantiate the degree to which your program meets each guideline. You may choose to develop a matrix on the computer so that sufficient space to respond is available. For each course used to satisfy a standard in the matrix, a complete syllabus must be included. For a given matrix item, list the number of the course (or experience) in which the item is covered. Specifically reference the part of the course syllabus containing evidence of coverage by category number, header, or other distinct reference point. If activities are included in your program, but are not reported in the syllabi or other documents, a short summary of the experience provided to candidates that demonstrates compliance may be typed directly into the matrix.

Example:

Educational Computing and Technology Literacy Program Standards Candidates will:	Evidence: Performance data, Courses, experiences
2.3.1 access and use telecommunications tools and resources for information sharing, remote information access and retrieval, and multimedia/hypermedia publishing	Educ. 448, III.A. Educ. 447, Resources: Candidates are required to develop a resource list in their major area of study. The telecommunications list includes current opportunities for use of telecommunications that are available for schools and contact address website, or phone number. Educ. 494 II.B. See webpage http://univ.edu for samples of student HyperStudio stacks and linked lists of resources.
<p>In the example above, the syllabi for Educ. 448 and 494 clearly document activities that illustrate access and use of telecommunications tools in section III. A., so only the reference to course numbers and sections of the course outline were needed to direct the program review document reader to evidence of compliance. However, an activity illustrating compliance with the identification of telecommunications resources was not included specifically in the Ed. 447 outline. Therefore, the program review document writer included the experience in the matrix in the form of a course number and brief description of the activity. Also a reference to location of candidate performance samples on the website was included as documentation. References to documentation of performances or performance data should be included as evidence that candidates have demonstrated performances meeting the program standards.</p> <p>In the left margin of the course syllabus, the program review document writer should reference each section of the outline to the standard or competency that it addresses. For example, Educ. 448 Sec. III. A. in the syllabus (referred to in the above example) would have 2.3.1 in the left margin to indicate which standard this section meets in the matrix.</p>	

Four copies of the program review document must be sent to NCATE with the institution's precondition package. If there are any questions about these program standards or the submission of this program review document, please contact Lajeane Thomas, Louisiana Tech University, P.O. Box 3161; Ruston, LA 71272; phone (318) 257-3923; Internet: LTHOMAS@LaTech.edu; fax (318) 257-4916 or 2379; or the NCATE office. The program review document preparation manual, *Curriculum Guidelines for Accreditation of Educational Computing and Technology Programs* (1997), can be purchased from ISTE, 1787 Agate Street, Eugene, OR 97403-1923, phone 541 346-4414, <http://www.iste.org>.

Institutions should feel free to contact any of the specialty organizations for help in preparing program review documents and rejoinders or with specific questions about individual sets of program standards. However, **program review**

ISTE Program Standards 3 ISTE Program Standards

documents and rejoinders should NOT be mailed directly to the specialty groups. These must be sent to the NCATE office. Mailing materials directly to the specialty groups means NCATE has no record of a submission. It could therefore complicate the program review process and result in no record of program approval in NCATE's biennial guide to accredited colleges and universities and/or cause delays in receiving critiques of program review documents and rejoinders. **Please ensure that program review document compilers are also aware that program review documents and rejoinders must be mailed to the NCATE office.**

If you have any questions about the program review process or if you need delays in submitting your program review documents or rejoinders, please contact the Coordinator of Program Reviews/Assistant to the Senior Vice President, at the NCATE office. **Program review documents and rejoinders should be sent to this person's attention.**

Length of the Program Review Document

A program review document must be limited to the following three sections and no more than a total of 140 pages:

- (1) All items listed in the overview section of the cover sheet that precedes each set of program standards. *This overview section must be limited to no more than 12 pages.*
- (2) Matrix for the appropriate program standards from the *NCATE Program Standards*. *Even when the matrix is printed from a computer, its length should be about the same as the original length in this document.*
- (3) Appendix with supporting documentation. This documentation is limited to sample syllabi, course descriptions, and/or uniquely specific information listed on the matrix. Course descriptions can be copied from the college catalog. *Do not submit a syllabus for each section of a course. Submit only a "generic" syllabus for the course.* NCATE does not have, nor require, a generic syllabus format. However, many professional education units have found it helpful to develop one for the program review and accreditation process. **Each item in the appendix must be correlated and/or cross-referenced to the matrix. The appendix must be limited to no more than 100 pages.**

Program review documents that exceed the 140-page limit may be returned to the unit and not sent to the specialty group for review.

Timelines

Institutions preparing program review documents for *continuing accreditation* reviews must submit 5 copies (all other programs require 4 copies, except initial and advanced physical education, health education, and reading education, require 5 copies and science education requires 3 copies) of the program review documents to NCATE 1 year before the visit, on the following schedule:

Semester of Visit	Program Review Documents Due at NCATE	Response from Specialty Professional Association Available by
Fall 2002	September 15, 2001	January 15, 2002
Spring 2003	February 1, 2002	July 15, 2002
Fall 2002	September 15, 2002	January 15, 2003
Spring 2004	February 1, 2003	July 15, 2003

Institutions that have not had an NCATE review under the current unit standards must submit 5 copies (all other programs require 4 copies, except initial and advanced physical education, health education, and reading education, require 5 copies and science education requires 3 copies) of the program review document to NCATE with their preconditions package 18 months before the visit, on the following schedule:

Semester of Visit	Program Review Documents Due at NCATE	Response from Specialty Professional Association Available by
Fall 2003	February 1, 2002	July 15, 2002
Spring 2004	September 15, 2002	February 1, 2003
Fall 2004	February 1, 2003	July 15, 2003
Spring 2005	September 15, 2003	February 1, 2004

After the response from ISTE has been received at NCATE, a copy will be forwarded to the NCATE coordinator at the institution. You then will have approximately two months to prepare a rejoinder for a second review by ISTE. It will take four to six months to receive a response to the rejoinder from ISTE. The preparation of the rejoinder is optional; it is not required by NCATE.

A list of institutional programs that are approved is published by NCATE as part of its *A Guide to College Programs in teacher Preparation*.

COVER SHEET
International Society for Technology in Education

Please submit two copies of this cover sheet.

Submitted by:

(Name of Institution)

Address:

Chief Compiler:

Phone: _____

Fax:

Date: _____

E-mail Address

Date of On-site Visit: _____

Name of program offered for review in this document: _____

Check levels offered:

- ____ Educational Computing and Technology Literacy Endorsement Program
- ____ Secondary Computer Science Education Endorsement Program
- ____ Secondary Computer Science Education Bachelor's Degree Program
- ____ Educational Computing and Technology Leadership Advanced Program

Classification:

- ____ Administration
- ____ Pre-School/Pre-K
- ____ K-12 Education
- ____ Kindergarten
- ____ Early Childhood
- ____ Elementary Education
- ____ Middle School Education
- ____ Secondary Education
- ____ Combined (specify): _____
- ____ Support Services
- ____ Other (specify): _____

Checklist of materials to be enclosed with this program review document:

____ Overview for each program, including the following:

- ____ (1) Explanation of the knowledge base, philosophy for preparation, and goals and objectives of the program.

- ____ (2) Candidates' course of studies, including name of program, level of preparation, and exact courses and recommended sequence. Indicate all required courses in the specialty area.
- ____ (3) Description of field experiences, student teaching, and internships, as appropriate per program. Include the amount of time and the type of supervision.
- ____ (4) Explain how a program may deviate from the program standards.
- ____ (5) Description of where the program is located within the professional education unit and its interrelationships with other programs in the unit and the university/college.
- ____ (6) List of faculty with assignments in the program. Use LIST OF FACULTY form provided. (Do not send vitae).
- ____ (7) a. Number of candidates currently enrolled in the program.
b. Number of graduates from each program over the past three years.
- ____ (8) Course Information. For the course offered as a part of the specialty and professional education program, please submit a separate document which includes the following: a) course name and number; b) catalogue description; c) course syllabus, including list of topics, selected activities as appropriate to program standards being addressed, bibliography and text(s) used (An existing syllabus may be attached if it covers the items listed.); d) course history for the past two years which includes the number of sections of this course that were taught, when and by whom the course/sections were taught. When listing staff, please indicate their rank and whether full or part time. Include a brief description of and indicate the amount of time spent in lab experiences for this course.
- ____ (9) Attach a copy of any written policies or procedures that guide or govern each program (e.g., State Guidelines, etc.).
- ____ (10) Indicate labs/classroom computer facilities available for use in this program
- ____ (11) Criteria used at admission to post-baccalaureate programs to determine if the candidate has adequate academic background in the subject to be taught should be submitted.
- ____ (12) Criteria used at completion of program and follow-up in the field to determine if the program has prepared the candidate for positions in educational computing and technology fields.

____ Matrix/Matrices

____ College Catalog

I verify that the information provided in this program review document is accurate and true:

Name (please print)

Signature

Position

Telephone

Address

LIST OF FACULTY

	Program:						
Include one sheet per program for which accreditation is sought.							
List faculty teaching specialty area and professional area coursework in the program.							
	Name (include full/part adjuncts, TA's, other)	Highest Degree Attained	Tenure Track? (Yes/No)	Rank	Full Time at University? (Yes/No)	% Time in	Dept.
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International Society for Technology in Education (ISTE)
Standards for Initial Endorsement in
Educational Computing and Technology Literacy

1.0 Prerequisite Preparation - Foundations. Professional studies culminating in the educational computing and technology literacy endorsement prepare candidates to use computers and related technologies in educational settings. All candidates seeking initial certification or endorsements in teacher preparation programs should have opportunities to meet the educational technology foundations standards.	
1.1 Basic Computer/Technology Operations and Concepts. Candidates will use computer systems run software; to access, generate, and manipulate data; and to publish results. They will also evaluate performance of hardware and software components of computer systems and apply basic troubleshooting strategies as needed.	
Performance Indicators - Candidates Will:	Courses or Experiences to Fulfill the Program Standards
1.1.1 operate a multimedia computer system with related peripheral devices to successfully install and use a variety of software packages.	
1.1.2 use terminology related to computers and technology appropriately in written and oral communications.	
1.1.3 describe and implement basic troubleshooting techniques for multimedia computer systems with related peripheral devices.	
1.1.4 use imaging devices such as scanners, digital cameras, and/or video cameras with computer systems and software.	
1.1.5 demonstrate knowledge of uses of computers and technology in business, industry, and society.	

<p>1.2 Personal and Professional Use of Technology.</p> <p>Candidates will apply tools for enhancing their own professional growth and productivity. They will use technology in communicating, collaborating, conducting research, and solving problems. In addition, they will plan and participate in activities that encourage lifelong learning and will promote equitable, ethical, and legal use of computer/technology resources.</p>	
Performance Indicators - Candidates Will:	Courses and Experiences to Fulfill the Program Standards
1.2.1 use productivity tools for word processing, database management, and spreadsheet applications.	
1.2.2 apply productivity tools for creating multimedia presentations.	
1.2.3 use computer-based technologies, including telecommunications, to access information and enhance personal and professional productivity.	
1.2.4 use computers to support problem solving, data collection, information management, communications, presentations, and decision making.	
1.2.5 demonstrate awareness of resources for adaptive assistive devices for students with special needs.	
1.2.6 demonstrate knowledge of equity, ethics, legal, and human issues concerning use of computers and technology.	
1.2.7 identify computer and related technology resources for facilitating lifelong learning and emerging roles of the learner and the educator.	

1.2.8	observe demonstrations or uses of broadcast instruction, audio/visual conferencing, and other distant learning applications.	
1.3	Application of Technology in Instruction. Candidates will apply computers and related technologies to support instruction in their grade level and subject areas. They must plan and deliver instructional units that integrate a variety of software, applications, and learning tools. Lessons developed must reflect effective grouping and assessment strategies for diverse populations.	
Performance Indicators - Candidates Will:		Courses or Experiences to Fulfill the Program Standards
1.3.1	explore, evaluate, and use computer/technology resources including applications, tools, educational software, and associated documentation.	
1.3.2	describe current instructional principles, research, and appropriate assessment practices as related to the use of computers and technology resources in the curriculum.	
1.3.3	design, deliver, and assess student learning activities that integrate computers/technology for a variety of student grouping strategies and for diverse student populations.	
1.3.4	design student learning activities that foster equitable, ethical, and legal use of technology by students.	
1.3.5	practice responsible, ethical, and legal use of technology, information, and software resources.	

2.0 Specialty Content Preparation in Educational Computing and Technology Literacy.	
Professional studies in educational computing and technology provide concepts and skills that prepare teachers to teach computer/technology applications and use technology to support other content areas.	
2.1 Social, Ethical, and Human Issues.	
Candidates will apply concepts and skills in making decisions concerning social, ethical, and human issues related to computing and technology.	
Performance Indicators - Candidates Will:	Courses and Experiences to Fulfill the Program Standards
2.1.1 describe the historical development and important trends affecting the evolution of technology and its probable future roles in society.	
2.1.2 describe strategies for facilitating consideration of ethical, legal, and human issues involving school purchasing and policy decisions.	
2.2 Productivity Tools.	
Candidates integrate advanced features of technology-based productivity tools to support instruction.	
Performance Indicators - Candidates Will:	Courses or Experiences to Fulfill the Program Standards
2.2.1 use advanced features of word processing, desktop publishing, graphics programs, and utilities to develop professional products.	
2.2.2 use spreadsheets for analyzing, organizing, and displaying numeric data graphically.	
2.2.3 design and manipulate databases and generate customized reports.	

2.2.4	use teacher utility and classroom management tools to design solutions for a specific purpose.	
2.2.5	identify, select, and integrate video and digital images in varying formats for use in presentations, publications, and/or other products.	
2.2.6	apply specific-purpose electronic devices (such as a graphing calculator, language translator, scientific probeware, or electronic thesaurus) in appropriate content areas.	
2.2.7	use features of applications that integrate word processing, database, spreadsheet, communication, and other tools.	
2.3 Telecommunications and Information Access. Candidates will use telecommunications and information access resources to support instruction.		
Performance Indicators - Candidates Will:		Courses or Experiences to Fulfill the Program Standards
2.3.1	access and use telecommunications tools and resources for information sharing, remote information access and retrieval, and multimedia/hypermedia publishing.	
2.3.2	use electronic mail and web browser applications for communications and for research to support instruction.	

2.3.3	use automated on-line search tools and intelligent agents to identify and index desired information resources.	
2.4	Research, Problem Solving, and Product Development. Candidates will use computers and other technologies in research, problem solving, and product development. Candidates use a variety of media, presentation, and authoring packages; plan and participate in team and collaborative projects that require critical analysis and evaluation; and present products developed.	
Performance Indicators - Candidates Will:		Courses or Experiences to Fulfill the Program Standards
2.4.1	identify basic principles of instructional design associated with the development of multimedia and hypermedia learning materials.	
2.4.2	develop simple hypermedia and multimedia products that apply basic instructional design principles.	
2.4.3	select appropriate tools for communicating concepts, conducting research, and solving problems for an intended audience and purpose.	
2.4.4	participate in collaborative projects and team activities.	
2.4.5	identify examples of emerging programming, authoring, or problem solving environments.	
2.4.6	collaborate in on-line workgroups to build bodies of knowledge around specific topics.	
2.4.7	use a computer projection device to support and deliver oral presentations.	

2.4.8	design and publish simple on-line documents that present information and include links to critical resources.	
2.4.9	develop instructional units that involve compiling, organizing, analyzing, and synthesizing of information and use technology to support these processes.	
2.4.10	conduct research and evaluate on-line sources of information that support and enhance the curriculum.	
3.0 Professional Preparation. Professional preparation in educational computing and technology literacy prepares candidates to integrate teaching methodologies with knowledge about use of technology to support teaching and learning.		
3.1 Teaching Methodology. Candidates will effectively plan, deliver, and assess concepts and skills relevant to educational computing and technology literacy across the curriculum.		
Performance Indicators - Candidates Will:		Courses or Experiences to Fulfill the Program Standards
3.1.1	design and practice methods and strategies for teaching concepts and skills related to computers and related technologies including keyboarding.	
3.1.2	design and practice methods and strategies for teaching concepts and skills for applying productivity tools.	
3.1.3	design and practice methods/strategies for teaching concepts and skills for applying information access and delivery tools.	

3.1.4	design and practice methods and strategies for teaching problem solving principles and skills using technology resources.	
3.1.5	observe in a K-12 setting where K-12 computer technology concepts and skills are being taught.	
3.1.6	practice methods and strategies for teaching technology concepts and skills in a lab and classroom setting.	
3.1.7	identify and support implementation and revision of computer/technology literacy curriculum to reflect on-going changes in technology.	
3.1.8	design and implement integrated technology classroom activities that involve teaming and/or small group collaboration.	
3.1.9	identify activities and resources to support regular professional growth related to technology.	
3.1.10	describe student guidance resources, career awareness resources, and student support activities related to computing and technology.	
3.1.11	compare national K-12 computer/technology standards with benchmarks set by local school districts and critique each.	
3.1.12	identify professional organizations and groups that support the field of educational computing and technology.	

3.1.13	design a set of evaluation strategies and methods that will assess the effectiveness of instructional units that integrate computers/technology.	
3.2	Hardware/Software Selection, Installation, and Maintenance. Candidates will demonstrate knowledge of selection, installation, management, and maintenance of the infrastructure in a classroom setting.	
Performance Indicators - Candidates Will:		Courses or Experiences to Fulfill the Program Standards
3.2.1	develop plans to configure computer/technology systems and related peripherals in laboratory, classroom cluster, and other appropriate instructional arrangements.	
3.2.2	identify and describe strategies to support development of school/laboratory policies, procedures, and practices related to use of computers/technology.	
3.2.3	research, evaluate, and develop recommendations for purchasing instructional software to support and enhance the school curriculum.	
3.2.4	research, evaluate, and develop recommendations for purchasing technology systems.	
3.2.5	design and recommend procedures for the organization, management, and security of hardware and software.	

3.2.6	identify strategies for troubleshooting and maintaining various hardware/software configurations.	
3.2.7	identify and describe network software packages used to operate a computer network system.	
3.2.8	configure a computer system and one or more software packages.	

International Society for Technology in Education (ISTE)
Program Standards for Advanced Programs in
Educational Computing and Technology Leadership

Prerequisite Preparation. As a prerequisite to the advanced program, candidates must document knowledge and competencies contained in the Educational Computing and Technology Literacy matrix.		
1.0 Foundations. Professional studies in basic educational computing and technology literacy builds a foundation for applying computers and related technologies (hardware and software) in educational settings. The advanced program must document the prerequisite preparation of the candidates or provide instruction to fulfill the Foundations program standards in the initial coursework.	<i>Complete the Foundations Section (1.0) of the Educational Computing and Technology Literacy Matrix.</i>	
2.0 Specialty Content Preparation in Educational Computing and Technology Literacy. Professional studies in basic educational computing and technology literacy provide concepts and skills that prepare teachers in the specialized and professional content for teaching educational computing and technology literacy and to use technology to support other content areas. Advanced programs must document the prerequisite preparation of the candidates or provide instruction to fulfill the educational computing and technology literacy program standards in initial coursework.	<i>Complete the Specialty Content Section (2.0) of the Educational Computing and Technology Literacy Matrix.</i>	
3.0 Professional Preparation in Educational Computing and Technology Literacy. Professional preparation in educational computing and technology literacy prepares candidates to integrate teaching methodologies with knowledge about use of technology to support teaching and learning. Advanced programs must document the prerequisite preparation of the advanced candidates or provide instruction to fulfill the educational computing and technology literacy program standards in initial coursework.	<i>Complete the Specialty Content section (3.0) of the Educational Computing and Technology Literacy Matrix.</i>	

4.0 Specialty Content Preparation for Educational Computing and Technology Leadership. Professional studies in educational computing and technology leadership prepare candidates to exhibit leadership in the identification, selection, installation, maintenance, and management of computing hardware and software and the uses of computers and related technologies throughout the curriculum.	
4.1 Research and Theories. Candidates will identify and apply educational and technology-related research, the psychology of learning, and instructional design principles in guiding use of computers and technology in education.	
Performance Indicators - Candidates Will:	Courses or Experiences to Fulfill the Program Standards
4.1.1 summarize and apply principles and practices of educational research in educational technology.	
4.1.2 summarize major research findings and trends related to the use of technology in education to support integration of technology in a K-12 environment.	
4.1.3 apply theories of learning, teaching, and instructional design and their relationship to the use of technology to support learning.	
4.1.4 describe social and historical foundations of education and how they relate to the use of technology in schools.	
4.1.5 identify research related to human and equity issues concerning the use of computers and related technologies in education.	
4.1.6 design a research project that includes evaluating the use of a specific technology in a K-12 environment.	

<p>4.2 Instructional Design and Product Development.</p> <p>Candidates will evaluate authoring and programming environments for use in the classroom. They will apply instructional design principles to develop, implement, and test interactive multimedia instructional products using authoring environments.</p>	
Performance Indicators - Candidates Will:	Courses or Experiences to Fulfill the Program Standards
4.2.1 use and apply more than one computer authoring and/or programming environment.	
4.2.2 describe the characteristics and uses of current authoring environments and evaluate their appropriateness for classroom applications.	
4.2.3 describe the characteristics and uses of current programming and scripting environments and evaluate their appropriateness for classroom use.	
4.2.4 apply instructional design principles to the design of screens, text, graphics, audio, and video in instructional products under development.	
4.2.5 describe and practice strategies for testing and evaluating instructional products designed.	
4.2.6 apply instructional design principles to develop substantive interactive multimedia computer-based instructional products.	
<p>4.3 Information Access and Delivery.</p> <p>Candidates will implement information access and delivery resources in K-12 schools to support the curriculum.</p>	
Performance Indicators - Candidates Will:	Courses or Experiences to Fulfill the Program Standards

4.3.1	identify and use information access and telecommunication tools to support research and instruction throughout the curriculum.	
4.3.2	use and implement distance learning delivery systems including computer, audio, and video conferencing.	
4.3.3	create multimedia presentations using advanced features of a presentation tool and deliver them using computer projection systems.	
4.3.4	install, configure, and use local mass storage devices and media to store and retrieve information and resources.	
4.3.5	describe issues related to selecting, installing, and maintaining WANs for school districts.	
4.4 Operating Systems. Candidates will install, customize, and configure the operating systems of computers and computer networks in school settings.		
Performance Indicators - Candidates Will:		Courses or Experiences to Fulfill the Program Standards
4.4.1	identify and describe the major operating systems associated with computing platforms found in K-12 schools.	
4.4.2	identify and manipulate preferences, defaults, and other selectable features of operating systems commonly found in K-12 schools.	

4.4.3	use and manipulate net- working software to effectively manage the operation of an LAN.	
4.4.4	evaluate, troubleshoot, install, and maintain computer operating systems for classrooms and laboratories.	
<p>4.5 Software/Hardware Selection, Installation, & Maintenance.</p> <p>Candidates will identify and implement software in both classroom and administrative environments. They will investigate issues related to school/site planning, purchasing, and technology integration.</p>		
Performance Indicators - Candidates Will:		Courses or Experiences to Fulfill the Program Standards
4.5.1	identify and describe software used in classroom and administrative settings, including productivity tools, information access/telecom- munications tools, multimedia/hypermedia tools, school management tools, evaluation/portfolio tools, and computer-based instruction.	
4.5.2	investigate and recommend purchasing strategies and procedures for acquiring administrative and instructional software for educational settings.	
4.5.3	describe evaluation criteria for software and identify reliable sources of software evaluations.	
4.5.4	identify and implement methods of installation, maintenance, inventory, and management of software libraries.	

4.5.5	develop and implement ethical and legal procedures for maintaining software libraries.	
4.5.6	identify and classify adaptive assistive hardware and software for students and teachers with special needs and locate sources to assist in procurement and implementation.	
5.0 Professional Preparation in Educational Computing and Technology Leadership Professional studies in educational computing and technology combine leadership skills and concepts with knowledge about use of computers and related technologies in schools. Advanced programs preparing educators for a specialty in educational computing and technology require studies of and experiences with leadership, staff development, and supervisory concepts and skills as they relate to use of technology-based systems in K-12 education.		
5.1 Instructional Program Development. Candidates will develop curricular plans based on local, state, and national standards for the use of computers and other associated technologies.		
Performance Indicators - Candidates Will:		Courses or Experiences to Fulfill the Program Standards
5.1.1	describe and analyze accepted principles of strategic planning to facilitate curriculum design for teaching with computers and related technologies.	
5.1.2	identify and use national, state, and local guidelines to develop curriculum plans for integrating technology in the K-12 environment.	
5.2 Teaching Methodology. Candidates will apply effective methods and strategies for teaching the use of technology tools.		
Performance Indicators - Candidates Will:		Courses or Experiences to Fulfill the Program Standards

5.2.1	demonstrate methods for teaching hypermedia development, scripting, and/or computer programming in a problem-solving context in K-12 schools.	
5.2.2	demonstrate methods for teaching at least one modern authoring tool to colleagues and students.	
5.2.3	demonstrate methods for teaching uses of media-based tools, such as television, audio, print media, and graphics.	
5.2.4	demonstrate methods for teaching social, ethical, and legal issues and responsible use of technology.	
5.3 Staff Development. Candidates will demonstrate knowledge of issues and models related to leadership in staff development. Candidates will plan and design staff development activities for educational settings.		
Performance Indicators – Candidates Will:		Courses or Experiences to Fulfill the Program Standards
5.3.1	plan and design staff development programs.	
5.3.2	describe and identify resources for staff development.	
5.3.3	plan and customize staff development based on differing audiences, including school and district decision-makers.	
5.4 Facilities and Resource Management. Candidates will demonstrate knowledge of issues related to facilities and resource management.		
Performance Indicators – Candidates Will:		Courses or Experiences to Fulfill the Program Standards

5.4.1	describe and use budget planning and management procedures related to educational computing and technology facilities and resources.	
5.4.2	identify funding sources available at local, state, and/or national level and collaborate on development of a grant proposal.	
5.4.3	plan, develop, implement, and evaluate strategies and procedures for resource acquisition and management of technology-based systems including hardware and software.	
5.4.4	identify, describe, and analyze procedures related to basic trouble shooting, preventive maintenance, and procurement of system wide maintenance services.	
5.4.5	describe and maintain current information involving facilities planning issues related to computers and related technologies.	
5.4.6	design and develop policies and procedures concerning staffing, scheduling, and security for managing computers/technology in a variety of instructional and administrative school settings.	
5.5	Managing the Change Process. Candidates will demonstrate knowledge of strategies for and issues related to managing the change process in schools.	
Performance Indicators - Candidates Will:		Courses or Experiences to Fulfill the Program Standards

5.5.1	evaluate school and district technology plans, and recommend improvements.	
5.5.2	discuss issues relating to building collaborations, alliances, and partnerships involving educational technology initiatives.	
5.5.3	demonstrate knowledge of effective group process skills.	
5.5.4	use evaluation findings to recommend modifications in technology implementations.	
5.6	Field Experiences. Candidates will participate in field experiences that allow them to (1) observe the use of technology to support instruction, the management of technology resources in educational settings, and the evaluation of effectiveness of technology resources for teaching and learning; and (2) apply technology resources to support instruction in classroom settings.	
Performance Indicators - Candidates Will:		Courses or Experiences to Fulfill the Program Standards
5.6.1	observe and compare methods and strategies used in educational technology in a variety of authentic educational settings (i.e., elementary, middle, secondary, adaptive assistive classrooms, labs).	
5.6.2	develop and teach a series of lessons that apply technology resources to support instruction.	
5.6.3	document and assess a significant field-based activity involving experiences in instructional program development, staff development, facilities and resource management, or managing change related to technology use in schools.	

<p>5.6.4 document and assess experiences in implementing a WAN or LAN with Internet connectivity.</p>	
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**International Society for Technology in Education
Program Standards for Preparation in
Secondary Computer Science Education**

Initial Endorsement and Degree Programs

Introduction

Computer science education programs include instruction in computing and in professional education sufficient for a teacher to teach computer science in secondary level schools, and to assist other faculty as they teach students to use computing. The program standards and performances described in this document employ a broad definition of computer science education. Just as mathematics includes arithmetic, basic skills, and understandings necessary to effectively use mathematics, computer science is viewed as including the basic skills and understandings necessary to use computer-based technology. In particular, computer science educators should be concerned with all aspects of teaching about computing and teaching the effective use of computing. Clearly, secondary computer science teachers will not often teach keyboarding and other basic skills to elementary and middle school students, but computer science educators will likely be called upon, and should be competent to, assist their colleagues who are teaching such basic skills.

Additionally, computer science educators will need to be prepared to teach the more technical aspects of computing; for example, 1) problem analysis, 2) algorithm selection and evaluation, 3) program design, implementation, specification, and verification, and 4) systems analysis. Computer science teachers will also need to be prepared to assist students in understanding and adapting to the social and ethical issues arising from the use of technology.

Finally, computer science educators will often be called upon to assist colleagues in their use of computing and teaching students to use computing. Such activity will include installing hardware and software, and troubleshooting problems as they arise. It is also likely that secondary computer science educators will be called upon to assist their schools in technology planning.

Institutions with teacher preparation programs should provide their prospective computer science teachers some degree of preparation in all these areas of computing education. A program to do so could be considered to be at one of two levels of preparation in the discipline: 1) secondary computer science education endorsement or 2) a bachelor's degree in secondary computer science education.

The secondary computer science education endorsement provides minimum preparation to support teaching of secondary computer science education courses and to assist schools and teachers in use of technology in the classroom.

The secondary computer science education degree program provides additional depth in the areas of a) hardware, software, networking, security, and legal/ethical issues; b) educational technology content; c) student teaching and field experiences specifically in computer science education; and d) research and communications in computer science education.

The standards below describe preparation for the first of these, initial endorsement, which should be considered minimal and mainly appropriate for teaching technology literacy, and introductory computer science education.

**Program Standards for Preparation in
Secondary Computer Science Education**

Initial Endorsement

1.0	<p>Prerequisite Preparation.</p> <p>As a prerequisite to the advanced program, candidates must document knowledge and competencies contained in the Educational Computing and Technology Literacy matrix..</p>	
1.1	<p>Foundations. Professional studies in basic educational computing and technology literacy builds a foundation for applying computers and related technologies (hardware and software) in educational settings. This specialty program must document the prerequisite preparation of the candidates or provide instruction to fulfill the Foundations program standards in the initial course work.</p>	
1.2	<p>Specialty Content Preparation in Educational Computing and Technology Literacy. Professional studies in basic educational computing and technology literacy provide concepts and skills that prepare teachers in the specialized and professional content for teaching educational computing and technology applications and to use technology to support other content areas. This specialty program must document the prerequisite preparation of the candidates or provide instruction to fulfill the educational computing and technology literacy program standards in initial course work. (Submit Educational Computing and Technology Literacy matrix.)</p>	
2.0	<p>Specialty Content Preparation in Computer Science.</p> <p>Professional studies in computer science education for secondary teachers provide experiences selected to develop a breadth and depth of knowledge of computer science. Courses and performances fulfilling these requirements must include experiences beyond the beginning level in computer science. It is recommended that the following skills and concepts be equivalent in depth to at least the level achieved in 12 semester hours of instruction. (The specific number of hours recommended should not be construed as a requirement.)</p>	
2.1	<p>Laboratory-based Experiences in Computer Science. Candidates will perform laboratory-based experiments that demonstrate proficiency in programming a high-level language, involve the use of advanced data structures and algorithm analysis, and illustrate differences in the organization of major programming languages.</p>	
Performance Indicators – Candidates Will:		Evidence: Performance Data, Experiences, Courses
2.1.1	<p>write programs in a high-level language that demonstrate proficient use of program design and verification methodologies and that represent the core areas of computer science. (It is recommended that these skills and concepts be equivalent in depth to at least the level that may be achieved in a two-semester sequence of course work.)</p>	

Performance Indicators – Candidates Will:	Evidence: Performance Data, Experiences, Courses
2.1.2 apply advanced knowledge of abstract data types and algorithm analysis. (It is recommended that these skills and concepts be equivalent in depth to at least the level that may be achieved in a three-semester hour course which builds on competencies developed for item 2.1.1. However, the specific number of hours recommended should not be construed as a requirement.)	
2.1.3 demonstrate knowledge in the organization of programming languages, implement examples using the major language paradigms, apply features that reflect modern language trends such as object-oriented programming, and produce modules using at least two different types of language.	
2.2 Breadth in Computer Science. Candidates will demonstrate proficiency in core areas of computer science including programming in at least two high-level programming languages, participating in team software development projects, using multiple computing environments, and demonstrating written and oral communication skills.	
Performance Indicators - Candidates Will:	Evidence: Performance Data, Experiences, Courses
2.2.1 develop projects that require knowledge in at least two high-level programming languages.	
2.2.2 participate in team software development projects.	
2.2.3 use a variety of computing environments (e.g., single and multi-user systems with different operating systems)..	
2.2.4 demonstrate written and oral communication skills by writing at least one research paper and delivering at least one oral presentation related to computer science.	

3.0 Professional Preparation. Professional studies culminating in computer science education endorsements provide studies of and experiences in the methods, techniques, and strategies related to teaching computer science at the secondary level. (It is recommended that these experiences be equivalent in depth to at least the level achieved in three or more semester hours of instruction. However, the specific number of hours recommended should not be construed as a requirement.)	
3.1 Materials, Methods, and Resources for Teaching. Candidates will use appropriate materials, methods, resources, and curricula for teaching secondary computer science.	
Performance Indicators - Candidates Will:	Evidence: Performance Data, Experiences, Courses
3.1.1 identify and model problem-solving strategies for secondary computer science instruction.	
3.1.2 demonstrate the uses of computers and related technologies as teaching tools for secondary computer science instruction.	
3.1.3 select and use appropriate materials and models for teaching secondary computer science.	
3.1.4 identify resources to enrich the teaching of computer science.	
3.1.5 describe the secondary computer science curriculum and its relationship to the K-12 curriculum and the college computer science curriculum.	
3.2 Professional Development. Candidates will engage in practices that reflect their roles as teaching and computing professionals.	
Performance Indicators - Candidates Will:	Evidence: Performance Data, Experiences, Courses
3.2.1 discuss guidance roles and plan enrichment activities for secondary computer science students (e.g., computing career guidance, preparation for college, fundamental skills, and extracurricular activities such as computer clubs and organized competitions).	
3.2.2 identify and describe professional computer science and computer education societies that provide opportunities for professional growth of the computer science teacher.	

3.3 Classroom and Instructional Management Methodologies. Candidates will use appropriate materials, methods, resources, and curricula for teaching secondary computer science.	
Performance Indicators - Candidates Will:	Evidence: Performance Data, Experiences, Courses
3.3.1 identify and present secondary computer science content.	
3.3.2 develop and implement instructional strategies for dealing with different learning styles and diverse populations (e.g., populations with special needs).	
3.3.3 apply effective methods of assessment and evaluation and use appropriate feedback techniques.	
3.3.4 model behaviors that reflect knowledge of gender, ethical, and multicultural issues in computer science education.	
3.3.5 demonstrate techniques for teaching students about the legal and ethical issues surrounding the uses of computers in society and for promoting ethical behaviors in students.	
3.4 Laboratory Management. Candidates will apply methods and skills appropriate to management of a secondary computer science lab.	
Performance Indicators - Candidates Will:	Evidence: Performance Data, Experiences, Courses
3.4.1 design, develop, and evaluate laboratory activities and demonstrations for the computer science classroom.	
3.4.2 demonstrate laboratory management skills and techniques necessary to support computer science classroom activities.	

Program Standards for Preparation in Secondary Computer Science Education

Initial Degree Program

Institutions with teacher preparation programs should provide their prospective computer science teachers with some degree of training in educational computing and technology literacy as a foundation for teaching computing education as well as preparation for teaching secondary computer science at one of two levels in the discipline: 1) secondary computer science education endorsement or 2) a bachelor's degree in secondary computer science education. The standards below describe preparation for the latter of these – a bachelor's degree in computer science education which should be considered full qualification for teaching and computer science at the secondary level.

1.0 2.0	<p>Prerequisite Preparation.</p> <p>As a prerequisite to the advanced program, candidates must document knowledge and competencies contained in the Educational Computing and Technology Literacy matrix..</p>
1.1	<p>Foundations. Professional studies in basic educational computing and technology literacy builds a foundation for applying computers and related technologies (hardware and software) in educational settings. This specialty program must document the prerequisite preparation of the candidates or provide instruction to fulfill the Foundations program standards in the initial course work.</p>
1.2	<p>Basic Specialty Content Preparation in Educational Computing and Technology Literacy. Professional studies in basic educational computing and technology literacy provide concepts and skills that prepare teachers in the specialized and professional content for teaching educational computing and technology applications and to use technology to support other content areas. This specialty program must document the prerequisite preparation of the candidates or provide instruction to fulfill the educational computing and technology literacy program standards in initial course work. (Submit Educational Computing and Technology Literacy Matrix.)</p>
1.3	<p>Computer Science Education Endorsement Content. Initial degree programs in Secondary Computer Science Education should include the skills indicated in the computer science education endorsement program standards. (Include Secondary Computer Science Education Endorsement Matrix.)</p>
2.0	<p>Specialty Content Preparation in Computer Science and Educational Technology.</p> <p>Professional studies in computer science education for secondary teachers provide experiences selected to develop a breadth of knowledge in computer science and educational technology. Such preparation can be achieved by the following experiences:</p>
2.1	<p>Additional Computer Science Content. Candidates will develop breadth and depth in the field of computer science. (It is recommended that the following skills and concepts be equivalent in depth to at least the level achieved in 12 semester hours of computer science instruction which build upon the experiences of endorsement program requirements. However, the number of semester hours recommended should not be construed as a requirement.)</p>

Performance Indicators - Candidates Will:	Evidence: Performance Data, Experiences, Courses
2.1.1 use both command-line and graphical user interfaces to perform standard operating systems functions (e.g., manage devices and files, load, run, and install applications).	
2.1.2 describe the basic capabilities of computers at the hardware level, including data representation and its limitations or risks.	
2.1.3 describe the operation of a computer system – CPU, peripherals, operating system, and application – indicating the purpose and interaction of the various components.	
2.1.4 describe the underlying principles of local- and wide-area networks.	
2.1.5 analyze the risks to correctness, security, and privacy in various applications of computing technology.	
2.1.6 analyze the impact (on existing social and professional practice) of various applications of computing and the legal and ethical issues arising from the applications.	
2.2 Educational Technology Content. Candidates will develop expertise in the identification, selection, installation, maintenance, and management of computing hardware and software and in the uses of computers and related technologies as instructional tools.	
Performance Indicators - Candidates Will:	Evidence: Performance Data, Experiences, Courses
2.2.1 use more than one computer authoring and/or programming environment.	
2.2.2 use, configure, and install local mass storage devices and media to store and retrieve information and resources.	
2.2.3 identify and describe the major operating systems associated with computing platforms found in K-12 schools.	

Performance Indicators - Candidates Will:		Evidence: Performance Data, Experiences, Courses
2.2.4	identify and manipulate preferences, defaults, and other selectable features of operating systems commonly found in K-12 schools.	
2.2.5	use and manipulate networking software to effectively manage the operation of a computer science classroom LAN.	
2.2.6	evaluate, troubleshoot, install, and maintain computer operating systems for classrooms and laboratories.	
2.2.7	identify and implement methods of installation, maintenance, inventory, and management of software libraries.	
2.2.8	develop and implement policies and procedures for legal and ethical use and maintenance of software libraries.	
2.3 Educational Technology Specialty Area. Candidates will develop projects that reflect in-depth coverage of one or more aspects of education computing at a level beyond the prerequisite foundations. This could normally be fulfilled by taking a specialized educational technology elective course. Examples of specialty areas may include: design of computer-based instructional systems, cognitive issues related to computer-based instruction, exploration of educational programming languages, hypermedia and multimedia applications, computer networks, artificial intelligence, and expert systems.		
Performance Indicators - Candidates Will:		Evidence: Performance Data, Experiences, Courses
2.3.1	develop projects that reflect in-depth coverage of one or more aspects of educational computing at a level beyond the prerequisite foundations.	
2.3.2	identify and discuss issues related to the role or use of technology specialty area within the field of education.	
3.0 Professional Preparation. Professional studies culminating in the computer science education degree provide experiences beyond the endorsement level that provide studies of and experiences in methods, techniques, and strategies related to teaching computer science at the secondary level.		
3.1 Classroom and Field Experiences. Candidates will engage in classroom and field experiences in secondary computer science essential for the preparation of the preservice computer science teacher.		

Performance Indicators - Candidates Will:	Evidence: Performance Data, Experiences, Courses
3.1.1 engage in field experiences beginning early in the program with an emphasis on observation, participation, and tutoring, including mini-teaching, diagnosis, planning lessons with other teachers, and writing tests and laboratory exercises.	
3.1.2 conduct observation of and direct instructional activities in secondary computer science classes.	
3.2 Special Methods. Candidates will apply strategies for developing among their students' professional judgment and social, legal, ethical, and evaluate responsibility related to the computer science classroom.	
Performance Indicators - Candidates Will:	Evidence: Performance Data, Experiences, Courses
3.2.1 guide secondary students in exploring and reaching principled conclusions about ethical and social issues relating to computing.	
3.2.2 guide secondary students in assessing the correctness and quality of the computer-based products they have developed.	
3.3 Student Teaching Experiences. Candidates will participate in student teaching experience involving secondary computer science classes.	
Performance Indicators – Candidates Will:	Evidence: Performance Data, Experiences, Courses
3.3.1 participate in a student teaching experience of at least 10 weeks in computer science classrooms.	
3.3.2 plan and conduct instruction for students in secondary computer science classes.	
3.3.3 assist with management of secondary computer science classroom laboratories.	

3.4 Written and Oral Communication Skills. Candidates will develop written and oral communication skills needed to deliver technical information to peers, students, and others	
Performance Indicators - Candidates Will:	Evidence: Performance Data, Experiences, Courses
3.4.1 develop written and oral communication skills necessary to conduct a computer science class. Evidence of evaluation of proficiency in these areas should be documented.	
3.4.2 develop written and oral communication skills needed to promote and articulate computer science education and computer literacy to individuals outside the field as well as those within the field.	
3.5 Research. Candidates will identify areas of computer science research of particular interest through professional readings.	
Performance Indicators - Candidates Will:	Evidence: Performance Data, Experiences, Courses
3.5.1 demonstrate knowledge of research pertaining to uses of the computer in the K-12 curriculum.	
3.5.2 demonstrate knowledge of research pertaining to computer science education.	